I S S U A N C E  T R A N S M I T T A L
S H E E T

N A S A
National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

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Issuance Number: MMI 5350.1 Date: March 26, 1991

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Material Transmitted:

1. Management Instruction MMI 5350.1, "MSFC Maintainability and Maintenance Planning for Space Systems"

2. This Instruction is written to establish previously undocumented management requirements applicable to MSFC Projects, and to clarify responsibilities of Safety and Mission Assurance Office (S&MA) and those of the other MSFC organizations involved.

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Filing Instructions:

File in a standard 3-ring binder in numerical sequence.

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M A N A G E M E N T
I N S T R U C T I O N

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Originating Organization: CR01 Effective Date: March 26, 1991 MMI: 5350.1

Subject: MSFC Maintainability and Maintenance Planning for Space Systems

1. PURPOSE

The purpose of this instruction is to establish policy, responsibilities, and procedures in order to provide common maintainability and maintenance planning for MSFC projects to:

a. Design maintainability into all systems at the very earliest project phase where maintenance is a factor in system operation and mission success; and

b. Ensure maintainability characteristics are developed and maintenance planning is accomplished through the system engineering process.

This instruction implements the latest edition of the NASA Handbook, "Maintainability Program Requirements for Space Systems," NHB 5300.4(1E), and NASA Management Instruction, "Maintainability and Maintenance Planning Policy," NMI 5350.1.

2. APPLICABILITY

This instruction applies specifically to MSFC laboratories and project offices having responsibility for the design of manned and unmanned projects when maintenance is planned. Expendable launch vehicles, one-shot systems, and payloads for which a decision has been made that maintenance will not be required are excluded. NHB 5300.4(1E), which pertains specifically to projects where on-orbit maintenance is planned, may be tailored to meet specific MSFC project needs and constraints in order to obtain a timely and cost effective maintainability program. In addition to projects requiring on-orbit maintenance, other projects may select portions of NHB 5300.4(1E), as appropriate, when maintainability characteristics must be included in the design.

3. AUTHORITY (Only applicable parts of most recent editions apply.)

NHB 5300.4(1E), "Maintainability Program Requirements for Space Systems"

NMI 5350.1, "Maintainability and Maintenance Planning Policy"

4. POLICY

a. Maintainability and maintenance planning shall be imposed to the extent necessary through inclusion of proper provisions in specifications and statements of work.

b. Maintainability and maintenance planning is applicable to all project phases. Since these are design drivers, special emphasis should be placed on imposing this MMI at the very earliest project phase in order to be cost effective.

c. This MMI is applicable to both MSFC in-house projects and MSFC contracts.

5. DEFINITIONS

The following definitions are per NHB 5300.4(1E):

a. Maintainability: A measure of the ease and rapidity with which a system or equipment can be restored to operational status following a failure. It is a characteristic of equipment and installation, personnel availability in the required skill levels, adequacy of maintenance procedures and equipment, and the physical environment under which maintenance is performed.

b. Maintenance: The act of diagnosing and physically repairing, or preventing, equipment failures.

6. RESPONSIBILITIES

Responsibilities of the various organizational elements are outlined in the enclosed attachment.

(Orig s/by)

T. J. Lee
Director

Attachment:
Responsibilities

Distribution:
SDL 2

RESPONSIBILITIES

1. Safety and Mission Assurance (S&MA) Office will:

a. Assure overall implementation of NMI 5350.1 and NHB 5300.4(1E) using this instruction.

b. Assist the project offices in tailoring NHB 5300.4(1E) to meet the specific project needs.

c. Establish and maintain a functional interface with the project line organization for the interpretation/ implementation of these requirements.

d. Act as the focal point for coordinating and providing comments on any maintainability data (plans, requirements, etc.) which require such action.

e. Support the projects with review of maintainability data to assure that the contractor has implemented the requirements per approved plans, guidelines, and procedures.

f. Provide day-to-day assistance to the Project Offices on matters pertaining to this MMI.

g. Perform reliability and maintainability analyses, provide data, and support Science & Engineering (S&E) in the preparation of maintainability and maintenance related analyses and reports required for in-house designed projects.

h. Monitor the maintainability demonstration tests and the maintainability engineering area in general, and provide support to the project in the areas of S&MA.

i. Prepare the Maintainability Program Plans for in-house projects (reference NHB 5300.4(1E), Paragraph 1E201).

j. Assist the project offices in implementing maintainability parameters/goals/quantitative requirements consistent with fund availability.

k. Evaluate design changes for impact on maintainability from an assurance standpoint as well as to provide the independent oversight to management.

l. Assist the project with evaluation of problem reports impacting maintainability to assure contractor compliance to reporting and assessment requirements.

m. Assist S&E in determining/identifying the maintenance planning required for the respective in-house project.

2. Science and Engineering will:

a. Ensure the implementation of the applicable portions of NHB 5300.4(1E) as defined by the project office in all appropriate specifications/requirements relating to space systems.

b. Prepare all applicable design requirements for the in-house hardware/software design and include maintenance planning requirements for in-house projects.

c. Be responsible for the Maintainability Demonstration Plan and tests to be performed for any in-house projects (reference NHB 5300.4(1E), Paragraph 1E503.1.). Prepare plan, perform tests, and document results.

d. Provide technical monitoring and assessments of contracted designs including data evaluation to determine technical adequacy of design compliance and maintenance planning activity.

e. Prepare required maintainability analyses and reports addressing maintenance concept, maintenance plan, repair or replacement levels, repair times, fault detection/isolation techniques, tool requirements, etc., for in-house projects.

f. Provide technical evaluation of design changes impacting maintainability.

g. Assist the project in evaluating problem reports and/or difficulties impacting maintainability and maintenance planning.

3. Managers of Project Offices are responsible for:

a. Providing funding in order to support a maintainability program which complies with the requirements of NHB 5300.4(1E) and NMI 5350.1 or alert the S&MA Office that budget levels will not support implementation of all requirements;

b. Defining which requirements of NHB 5300.4(1E) are not considered applicable for each specific project and coordinating all proposed deletions with the S&MA Office and S&E prior to implementation;

c. Scheduling documentation reviews, distributing review packages, and coordinating review issues;

d. Coordinating meetings;

e. Securing and providing maintainability data for government-furnished property (GFP) if available;

f. Establishing/coordinating project maintainability parameters/goals/quantitative requirements (availability, maintenance man-hours, time to restore, maximum false alarm rates, etc.);

g. Establishing and implementing a system with the project contractor that will:

(1) Monitor and verify the achievement of maintainability requirements.

(2) Identify, assess, track, and report problems occurring during maintenance and/or servicing that are attributable to system, subsystem, or design characteristics. There should be no duplication with the problem reporting and corrective action/problem assessment system already in place under S&MA. One system for all problems should suffice.

(3) Assure that design changes are made to systems, subsystems, and components to enhance maintainability consistent with program requirements and guidelines. Design changes that will reduce crew time for maintenance, improve ground turnaround time, or reduce the susceptibility to failure of safety/mission critical functions from human error during maintenance or servicing shall receive priority consideration.

4. Director, Procurement Office is responsible for:

a. Ensuring that NHB 5300.4(1E) is included in requests for proposals and resultant contracts for all space systems where on-orbit maintenance is planned to the extent requested by the initiating project office; and

b. Ensuring that for other projects where on-orbit maintenance is not applicable or required, applicable portions of NHB 5300.4(1E) are included in the request for proposal and resulting contracts to the extent requested by the initiating project office if not covered under a. above.

5. Director, Program Development is responsible for:

a. Incorporating the maintainability and maintenance planning requirements into those phase A and/or phase B studies in which on-orbit maintenance is planned; and

b. Performing trade studies to determine the appropriate level of maintainability and development of a preliminary design that implements the maintainability features.